M035	A	PBM035A	Buffalo-Rochester	WirelessCo, L.P.	$18,893,000
M035	B	PBM035B	Buffalo-Rochester	AT&T Wireless PCS Inc.	$19,864,000
M036	A	PBM036A	Salt Lake City	Western PCS Corporation	$45,847,030
M036	B	PBM036B	Salt Lake City	WirelessCo, L.P.	$46,179,852
M037	A	PBM037A	Jacksonville	Powertel PCS Partners, L.P.	$46,000,000
M037	B	PBM037B	Jacksonville	PCS PRIMECO, L.P.	$44,500,544
M038	A	PBM038A	Columbus	AT&T Wireless PCS Inc.	$22,290,000
M038	B	PBM038B	Columbus	American Portable Telecommunications, Inc.	$22,176,837
M039	A	PBM039A	El Paso-Alberquerque	Western PCS Corporation	$8,634,030
M039	B	PBM039B	El Paso-Alberquerque	AT&T Wireless PCS Inc.	$8,634,000
M040	A	PBM040A	Little Rock	Southwestern Bell Mobile Systems, Inc.	$12,732,501
M040	B	PBM040B	Little Rock	WirelessCo, L.P.	$12,321,000
M041	A	PBM041A	Oklahoma City	Western PCS Corporation	$11,111,111
M041	B	PBM041B	Oklahoma City	WirelessCo, L.P.	$13,142,346
M042	A	PBM042A	Spokane-Billings	Poka Lambro Telephone Cooperative, Inc.	$5,688,000
M042	B	PBM042B	Spokane-Billings	WirelessCo, L.P.	$6,191,000
M043	A	PBM043A	Nashville	WirelessCo, L.P.	$16,374,000
M043	B	PBM043B	Nashville	AT&T Wireless PCS Inc.	$15,810,000
M044	A	PBM044A	Knoxville	AT&T Wireless PCS Inc.	$10,635,000
M044	B	PBM044B	Knoxville	BellSouth Personal Communications, Inc.	$11,149,000
M045	A	PBM045A	Omaha	AT&T Wireless PCS Inc.	$4,647,000
M045	B	PBM045B	Omaha	Cox Cable Communications, Inc.	$5,078,000
M046	A	PBM046A	Wichita	AT&T Wireless PCS Inc.	$4,393,000
M046	B	PBM046B	Wichita	WirelessCo, L.P.	$4,901,343
M047	A	PBM047A	Honolulu	Western PCS Corporation	$22,361,030
M047	B	PBM047B	Honolulu	PCS PRIMECO, L.P.	$21,675,432
M048	A	PBM048A	Tulsa	Southwestern Bell Mobile Systems, Inc.	$17,562,369
M048	B	PBM048B	Tulsa	WirelessCo, L.P.	$16,801,654
M049	A	PBM049A	Alaska	American Portable Telecommunications, Inc.	$1,000,000
M049	B	PBM049B	Alaska	GCI Communication Corp.	$1,650,129
M050	A	PBM050A	Guam-Northern Mariana Islands	Poka Lambro Telephone Cooperative, Inc.	$107,000
M050	B	PBM050B	Guam-Northern Mariana Islands	American Portable Telecommunications, Inc.	$141,837
M051	A	PBM051A	American Samoa	South Seas Satellite Communications Corporation	$214,555
M051	B	PBM051B	American Samoa	Communications International Corporation	$228,001

				Total Bids	$7,019,403,797
				Total of Bid Withdrawal Penalties	$14,836,213
				Pioneer Preference Revenues	$701,780,374
			Omnipoint Corporation	$347,518,309	
			Cox Communications, Inc.	$251,918,526	
			American Personal Communications, L.P.	$102,343,539	
				Grand Total	$7,736,020,384

OMB Approval
3060-0621
Expires 10/31/97

ATTACHMENT B

"Ownership Exhibit A "*

Direct Ownership

1	2	3	4	5	6	7	8	9
Name and Address Title	Relationship	Citizenship	Principal Business	Outside Interests	Type of Interest Held	Amount Held	Percentage Held	Held on Behalf Of Name

* If applicants require additional space to respond to any Item, attach additional pages, but specify to which Exhibit and Item number those pages relate.

OMB Approval
3060 0621
Expires 10/31/97

ATTACHMENT C

"Ownership Exhibit B"*

Indirect Ownership

1	2	3	4	5	6	7	8	9	10
Name and Address Title	Relationship Name	Citizenship	Principal Business	Outside Interests	Type of Interest Held	Amount Held	Percentage Held	Held on Behalf Name	Interv. Interest

*If applicants require additional space to respond to any Item, attach additional pages, but specify to which Exhibit and Item number those pages relate .

APPENDIX B
Sample Electromagnetic Energy Emissions Calculations

Compliance with ANSI/IEEE RF Guidelines

A. Calculation of Maximum Permissible Exposure (MPE)

The IEEE C95.1-1991 guidelines for "uncontrolled" environments specify that power densities (as averaged over any 30 minute period) in the frequency range from 300-3000 MHz should not exceed values defined by the equation:

$$S = \frac{f}{1500}$$

Where:
- S = Power density in milliwatts per square centimeter (mW/cm^2)
- f = Frequency in MHz

For example, at a frequency of 1850 MHz the allowed power density would be 1850/1500 = 1.23 mW/cm^2.

Exposure of the user of a hand-held PCS transmitter must be evaluated in terms of the specific absorption rate (see part B below).

In all other cases, to determine the appropriate separation distance from a PCS transmitter to meet the MPE "uncontrolled" limits the following equation can be used.

$$S = \frac{P \times G}{4 \times \pi \times D^2}$$

Where:
- S = Allowed power density
- P = Power supplied to the antenna
- G = Antenna gain (numeric) relative to an isotropic antenna
- D = Minimum separation distance for continuous exposure

Solving for D:

$$D = \sqrt{\frac{P \times G}{4 \times \pi \times S}}$$

B. Exposure Evaluation for Hand-held PCS Transmitters

Section 4.2 of the ANSI/IEEE guidelines specifies criteria for evaluation of the exposure to users of hand-held, low-powered devices. The guidelines are given in terms of either power radiated from a device or specific absorption rate (SAR) caused by the device. Radiated power exclusions apply for operating frequencies between 100 kHz and 1500 MHz but do not apply when the device is maintained within 2.5 cm of the body of the user.

Until such time as it is decided that radiated power exclusions can be applied at frequencies above 1500 MHz (see footnote 139 in the text), compliance for a hand-held device operating at PCS frequencies between 1850 and 2200 MHz will require evaluation of the SAR produced by the device (see footnote 140).

The ANSI/IEEE guidelines specify that in "uncontrolled" environments, and for operating frequencies between 100 kHz and 6 GHz, compliance requires that spatial peak SAR not exceed 1.6 watts/kilogram (W/kg) as averaged over any 1 gram of tissue and as averaged over the appropriate time period defined in the standard. In the hands, wrists, feet and ankles spatial peak SAR shall not exceed 4 W/kg as averaged over any 10 grams of tissue.

APPENDIX C
Sample PCS/OFS Interference Calculations

A Procedure for Calculating PCS Signal Levels at Microwave Receivers

The new Rules adopted in Part 99 stipulate that estimates of interference to fixed microwave operations from a PCS operation will be based on the sum of signals received at a microwave receiver from the PCS operation. This appendix describes a procedure for computing this PCS level.

In general, the procedure involves four steps:

1. Determine the geographical coordinates of all microwave receivers operating on co-channel and adjacent frequencies within the coordination distance of each base station and the characteristics of each receiver, i.e., adjacent channel susceptibility, antenna gain, pattern and height, and line and other losses.

2. Determine an equivalent isotropically radiated power (e.i.r.p.) for each base station and equivalent e.i.r.p. values for the mobiles and portables associated with each base station. Determine the values of pertinent correction and weighting factors based on building heights and density and distribution of portables. Close-in situations, prominent hills, and extra tall buildings require special treatment.

3. Based on PCS e.i.r.p. values, correction and weighting factors, and microwave receiving system characteristics determined above, calculate the total interference power at the input of each microwave receiver, using the Longley-Rice propagation model.

4. Based on the interference power level computed in step 3, determine interference to each microwave receiver using criteria described in Part 99 and EIA/TIA Bulletin 10E.

The interference from each base station and the mobiles and portables associated with it is calculated as follows:

$$P_{rbi} = 10\mathrm{Log}(p_{tbi}) - L_{bi} - UC_i + G_{mwi} - AC_i$$

$$P_{rmi} = 10\mathrm{Log}(n_{mi} \times p_{tmi}) - L_{mi} - UC_i + G_{mwi} - AC_i$$

$$P_{rpsi} = 10\mathrm{Log}(n_{psi} \times p_{tpsi}) - L_{psi} - UC_i + G_{mwi} - AC_i$$

$$P_{rpbi} = 10\mathrm{Log}(n_{pbi} \times p_{tpbi}) - L_{pbi} - UC_i - (BP_i - BH_i) + G_{mwi} - AC_i$$

$$P_{rpri} = 10\mathrm{Log}(n_{pri} \times p_{tpri}) - L_{pri} - (UC_i - BH_i) + G_{mwi} - AC_i$$

where:
P refers to Power in dBm
p refers to power in milliwatts

P_{rbi} = Power at MW receiver from ith base station in dBm
P_{tbi} = e.i.r.p. transmitted from ith base station in milliwatts, which equals power per channel x number of channels x antenna gain with respect to an isotropic antenna - line loss
L_{bi} = Path loss between MW and base station site in dB
UC_i = Urban correction factor in dB
G_{mwi} = Gain of MW antenna in pertinent direction (dBi)
AC_i = Adjacent channel discrimination of MW system in dB
P_{rmi} = Power at MW receiver from mobiles associated with ith base station
P_{tmi} = e.i.r.p. transmitted from mobiles associated with ith base station
n_{mi} = Number of mobiles associated with ith base station
L_{mi} = Path loss between MW and mobile transmitters in dB
P_{rpsi} = Power at MW receiver from outdoor portables (s for sidewalk)
P_{tpsi} = e.i.r.p. transmitted from outdoor portables associated with ith base station
n_{psi} = Number of outdoor portables associated with ith base station
L_{psi} = Path loss between MW and outdoor portables in dB
P_{rpbi} = Power at MW receiver from indoor portables (b for building)
P_{tpbi} = e.i.r.p. transmitted from indoor portables associated with ith base station
n_{pbi} = number of indoor portables associated with ith base station
L_{pbi} = Path loss in dB between MW and base station site (using average building height divided by 2 as effective antenna height)
P_{rpri} = Power at MW receiver from rooftop portables (r for rooftop)
P_{tpri} = e.i.r.p. transmitted from rooftop portables associated with ith base station
n_{pri} = Number of rooftop portables associated with ith base station
L_{pri} = Path loss in dB between MW and base station site (using average building height as effective antenna height)
BP_i = Building penetration loss at street level in dB
BH_i = Height gain for portables in buildings dB = 2.5 x (nf-1), where nf is number of floors

Finally, the total PCS interference power at a given microwave receiver from all the base stations in a given frequency band is found by summing the contributions from the individual stations. Likewise, the total interference power at a given microwave receiver from all mobiles and portables operating in a given frequency band is found by summing the contributions from the mobiles and portables associated with each cell.

$$p_{rb} = \sum_i p_{rbi} \quad \text{milliwatts}$$

$$p_{rm} = \sum_i (p_{rmi} + p_{rpsi} + p_{rpbi} + p_{rpri}) \quad \text{milliwatts}$$

$$P = 10 \, Log(p) \quad \text{dBm}$$

Base Stations. Interference from each base station to each microwave should normally be considered independently. A group of base stations having more or less (within $\pm$ 50 percent) the same height above average terrain, the same e.i.r.p., basically the same path to a microwave receiving site, and subtending an angle to that receiving site of less than 5 degrees, may be treated as a group, using the total power of the group and the average antenna height of the group to calculate path loss, L.

The urban correction factor, UC, should not be applied to base station antenna heights that are greater than 50 percent of the average building height for a cell.

Mobile Stations. The e.i.r.p. from mobile transmitters is weighted according to the number of base station channels expected to be devoted to mobile operation at any given time. The antenna height of mobiles used in calculating path loss,L, is assumed to be 5 feet.

Portable Stations. The e.i.r.p. from the portable units associated with each base station is weighted according to the estimated portion of portables associated with that cell expected to be operated inside buildings at any given time and the portion which could be expected to be operating from elevated locations, such as balconies or building rooftops. For example, in the case of service intended for business use in an urban area, one might expect that perhaps 85 percent of the portables in use at any given time would be operating from within buildings and perhaps 5 percent might be operating from rooftops or balconies. The remaining 10 percent would be outside at street level.

Calculation of an equivalent e.i.r.p. for cells in suburban areas will involve different weighting criteria. Contributions to the e.i.r.p. from that portion of portables within a cell operating from inside single-family homes shall be reduced by 10 dB.

Urban Correction Factor. The urban correction factor (UC) depends on the height and density of buildings surrounding a base station. For the core area of large cities, it is assumed to be 35 dB. For medium size cities and fringe areas of large cities (4- to 6-story buildings with scattered taller buildings and lower buildings and open spaces) it is assumed to be 25 dB; for small cities and towns, 15 dB, and for suburban residential areas (one- and two-story, single family houses with scattered multiple-story apartment buildings, shopping centers and open areas), 10 dB.

Building Height and Building Penetration Factors. The building height correction, BH, is a function of the average building height within the nominal coverage area of the base station. It is used in conjunction with the building penetration loss, BP, to adjust the expected interference contribution from that portion of the portables transmitting from within buildings. The adjustment is given by:

BP = 20 dB in urban areas
BP = 10 dB in suburban areas

BH = 2.5 x (nf-1) dB

where nf is the average height (number of floors) of the buildings in the area.

(Note that this formula implies a net gain when the average building height is greater than 8 floors). All buildings more than twice the average height should be considered individually. The contribution to BH from that portion of portables in the building above the average building height should be increased by a factor of 20Log(h) dB, where h is the height of the portables above the average building height in meters.

Adjacent Channel Correction Factor. A factor based on the selectivity of the microwave receiver.

Propagation Model. The PCS to microwave path loss, L, is calculated using the Longley-Rice propagation model, Version 1.2.2., in the point-to-point mode. The Longley-Rice [1] model was derived from NBS Technical Note 101 [3], and updated in 1982 by Hufford [3]. Version 1.2.2 incorporated modifications described in a letter by Hufford [4] in 1985. Terrain elevations used as input to the model should be from the U.S. Geological Survey 3-second digitized terrain database.

Special Situations. If a cell size is large compared to the distance between the cell and a microwave receiving site so that it subtends an angle greater than 5 degrees, the cell should be subdivided and calculations should be based on the expected distribution of mobiles and portables within each subdivision.

If terrain elevations within a cell differ by more than a factor of two-to-one, the cell should be subdivided and microwave interference calculations should be based on the average terrain elevation for each subdivision.

If a co-channel PCS base station lies within the main beam of a microwave antenna (± 5 degrees), there is no intervening terrain, and the power at the microwave receiver from that base station, assuming free space propagation, would be 3 dB or less below the interference threshold, interference will be assumed to exist unless the PCS licensee can demonstrate otherwise by specific path loss calculations based on terrain and building losses.

If any part of a cell or cell subdivision lies within the main beam of a co-channel microwave antenna, there is no intervening terrain, and the accumulative power of 5 percent or less of the mobiles, assuming free space propagation would be 3 dB or less below the interference threshold, interference will be assumed to exist unless the PCS licensee can demonstrate otherwise by specific path loss calculations based on terrain and building losses.

If a building within a cell or cell subdivision lies within the main beam of a co-channel microwave antenna, there is no intervening terrain, and the cumulative power of 5 percent or fewer of the portables, assuming free space propagation, would be 3 dB or less below the interference threshold, interference will be assumed to exist unless the PCS licensee can demonstrate otherwise by specific path loss calculations based on terrain and building losses.

References:
1. Longley, A.G. and Rice, P.L., "Prediction of Tropospheric Radio Transmission Loss Over Irregular Terrain, A Computer Method-1968", ESSA Technical Report ERL 79-ITS 67, Institute for Telecommunications Sciences, July 1968.

2. Hufford, G.A., Longley, A.G. and Kissick, W.A., "A Guide to the use of the ITS Irregular Terrain Model in the Area Prediction Mode", NTIA Report 82-100, U.S. Department of Commerce, April 1982. Also, Circular letter, dated January 30, 1985, from G.A. Hufford, identifying modifications to the computer program.

3. Rice, P.L., Longley, A.G., Norton, K.A., Barsis, A.P., "Transmission Loss Predictions for Tropospheric Communications Circuits," NBS Technical Note 101 (Revised), Volumes I and II, U.S. Department of Commerce, 1967.

4. Hufford, G.A., Memorandum to Users of the ITS Irregular Terrain Model, Institute for Telecommunications Sciences, U.S. Department of Commerce, January 30, 1985.

APPENDIX B
Sample Electromagnetic Energy Emissions Calculations

Compliance with ANSI/IEEE RF Guidelines

A. Calculation of Maximum Permissible Exposure (MPE)

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$$S = \frac{f}{1500}$$

Where:
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For example, at a frequency of 1850 MHz the allowed power density would be $1850/1500 = 1.23\ mW/cm^2$.

Exposure of the user of a hand-held PCS transmitter must be evaluated in terms of the specific absorption rate (see part B below).

In all other cases, to determine the appropriate separation distance from a PCS transmitter to meet the MPE "uncontrolled" limits the following equation can be used.

$$S = \frac{P \times G}{4 \times \pi \times D^2}$$

Where:
- S = Allowed power density
- P = Power supplied to the antenna
- G = Antenna gain (numeric) relative to an isotropic antenna
- D = Minimum separation distance for continuous exposure

Solving for D:

$$D = \sqrt{\frac{P \times G}{4 \times \pi \times S}}$$

APPENDIX C
Sample PCS/OFS Interference Calculations

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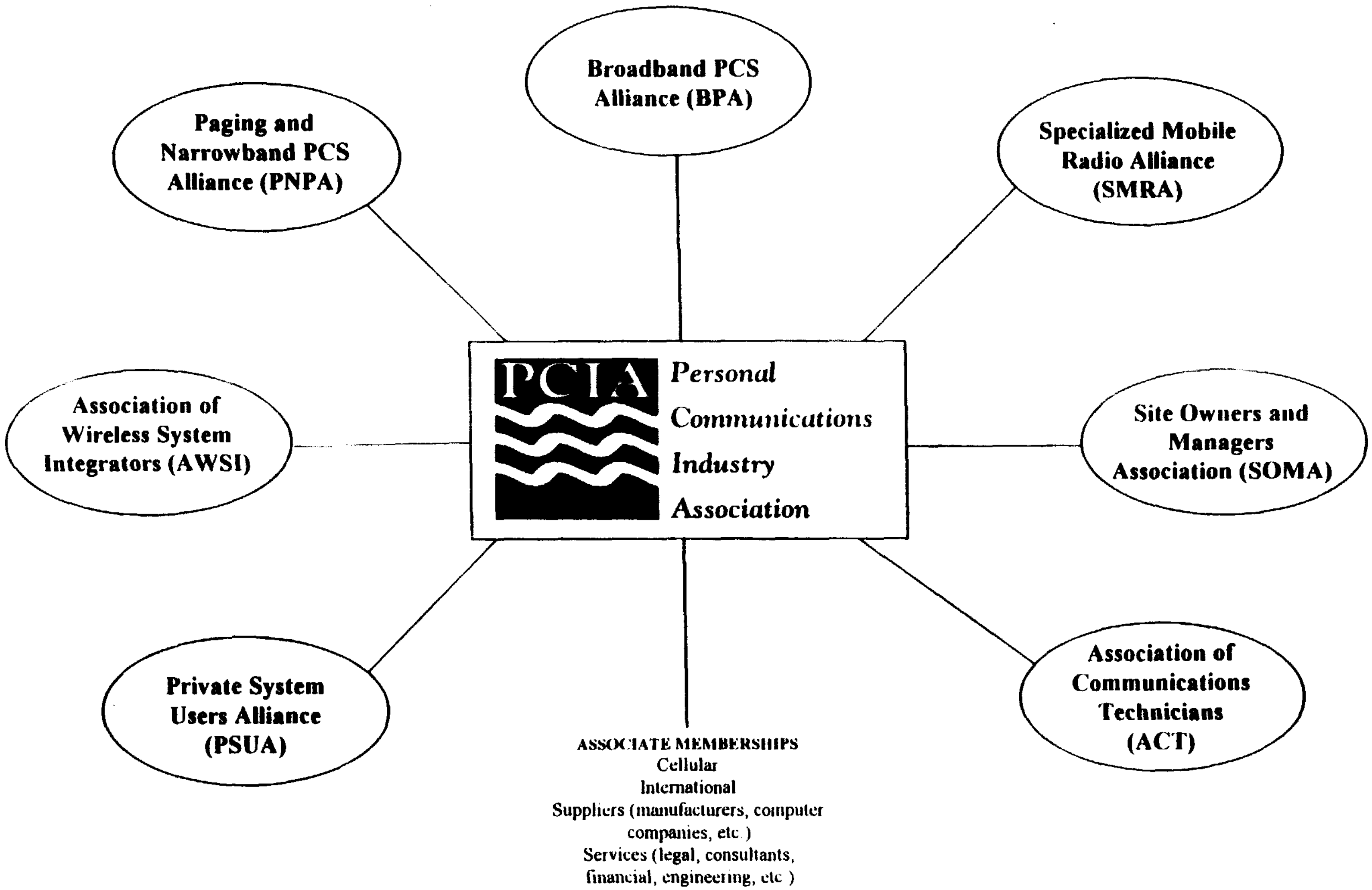
where:
P refers to Power in dBm
p refers to power in milliwatts

PCIA's Broad, Powerful Membership Base

A Federation of Alliances



PERSONAL COMMUNICATIONS INDUSTRY ASSOCIATION

900 MHz NARROWBAND PERSONAL COMMUNICATIONS SERVICES REGULATORY HANDBOOK

April 1995

Prepared By:

R. Michael Senkowski
Katherine M. Holden
Eric W. DeSilva
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WILEY, REIN & FIELDING

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TABLE OF CONTENTS

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I. INTRODUCTION

A. Purpose of This Handbook

This handbook is intended to provide a comprehensive review of the regulatory ground rules, as they currently exist, imposed by the Federal Communications Commission ("FCC") for the new licensed narrowband personal communications services ("PCS") operating in the 900 MHz band. It is designed to be a reference tool for the industry participating in this new segment of the wireless, mobile communications marketplace. A companion edition, the *2 GHz Broadband Personal Communications Services Regulatory Handbook*, provides a similar overview of the regulations applicable to PCS systems operating in the 2 GHz band. PCIA has also published a *Designated Entity Handbook*, which reviews in detail the ownership limitations on designated entities seeking to bid for PCS licenses, and a *1995 Interconnection Primer*, which provides a comprehensive guide to negotiating interconnection arrangements with local telephone companies.

While this handbook is intended to be a complete and accurate review of the licensing and operational requirements governing PCS, it is not meant to serve as a substitute for the reader's own review and analysis of the applicable regulations and policies. In addition, this handbook reviews only requirements imposed at the federal level by the FCC; there also may be applicable requirements imposed by state and local regulatory bodies. More importantly, as of the date of publication of this handbook, many rules and policies affecting PCS are undergoing further review by the FCC, and information contained in this handbook may be superseded by legal or regulatory developments that occur subsequent to publication. Before the reader undertakes any action based on the material set forth in this handbook, it is advisable to take steps to ensure that such action is based on the most current set of facts, governing laws and rules, and their interpretation.

B. PCIA and Its Objectives

1. Committed to the Wireless Vision

Whether your company offers paging, cellular, data or any other form of communications services, the key concept of "personalized communications" will drive your business in the communications world of the future. As the wireless communications industry continues to target the mass market, knowing what the consumer wants and needs and developing personalized services to meet those needs will be vital to success.

Established in 1949, the Personal Communications Industry Association (formerly Telocator) is the leading national trade association for companies in the PCS industry. Since its inception, PCIA has been instrumental in advancing regulatory policies, legislation and technological standards that have helped launch the age of personal communications services.

One of PCIA's greatest strengths is its ability to foster and to represent consensus in order to advance the interests of the PCS industry. Through market forecasts, publications, committees, and its annual convention -- the Personal Communications Showcase -- PCIA is committed to maintaining its position as the association for the PCS industry.